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New records and extension of geographical distribution of *Heterophallus echeagarayi* (Poeciliidae) in the Usumacinta Province, Mexico

by

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Résumé. – Nouveaux signalements et extension de la répartition géographique de *Heterophallus echeagarayi* (Poeciliidae) dans la Province Usumacinta, Mexique.

Le poecilid *Heterophallus echeagarayi* (Álvarez, 1952) a été signalé dans le bassin hydrologique de Tonalá et Grijalva-Usumacinta (Mexique). Cependant, la limite actuelle de sa répartition pourrait être due à l'absence de prélèvements spécifiques d'espèces de petite taille dans les bassins voisins ayant des habitats et des conditions environnementales similaires. Notre objectif a été de vérifier sa répartition en effectuant de nombreux échantillonnages dans le même bassin ainsi que dans les bassins adjacents. Les résultats ont montré une augmentation des signalements dans le bassin de Grijalva-Usumacinta, et en particulier dans la rivière Palizada, ainsi que l'extension de sa répartition géographique vers les bassins Chumpan, Candelaria et Mamantel. Les premiers signalements de *H. echeagarayi* dans ces trois bassins ont permis une mise à jour de la zone de répartition géographique de cette espèce dans la plaine côtière du Sud du golfe du Mexique.

Key words. – Poeciliidae – *Heterophallus echeagarayi* - Mexico - Usumacinta Province - Geographic distribution - New records.

The genus *Heterophallus* is distributed from the Coatzacoalcos basin to the Grijalva-Usumacinta basin in the coastal plain of the South Gulf of Mexico (Espinosa-Pérez and Daza-Zepeda, 2005; Miller *et al.*, 2005; Macossay-Cortez *et al.*, 2011; Riesch *et al.*, 2011). This genus includes three species: *H. rachovii* Regan, 1914, *H. milleri* Radda, 1987 and *H. echeagarayi* (Álvarez, 1952). The latter is distinguished from the first two by males showing prominent fleshy palps on the side of the gonopodium and lack of pigment blotch in dorsal fin (Miller *et al.*, 2005).

Heterophallus echeagarayi, also validated as *Gambusia echeagarayi* by Lucinda (2003), has been considered endemic in the Grijalva-Usumacinta Division (Minckley *et al.*, 2005), although it had been recorded in the Tonalá basin (Espinosa-Pérez and Daza-Zepeda, 2005; Miller *et al.*, 2005). However, most published records come from the Grijalva-Usumacinta basin (Álvarez del Villar, 1952; Miller, 1966; Velasco, 1976; Lozano-Vilano and Contreras-Balderas, 1987; Espinosa-Pérez and Daza-Zepeda, 2005; Miller *et al.*, 2005).

Nevertheless, their current known geographic delimitation could reflect a lack of specific samplings of small-bodied fish in

the surrounding basins with similar habitats and environmental conditions, as small freshwater fish are commonly unrecorded due to their distribution patterns (Olden *et al.*, 2007) and the selectivity of sampling gears frequently used in the Chumpan and Candelaria basins (for example, Ayala-Pérez *et al.*, 2012). The aim of this study was to review the present distribution of *H. echeagarayi* by sampling specimens in surrounding basins.

MATERIAL AND METHODS

The findings come from diurnal samplings carried out in 79 sites located in the Coatzacoalcos, Grijalva-Usumacinta, Chumpan, Candelaria and Mamantel basins. Sampling was achieved from July

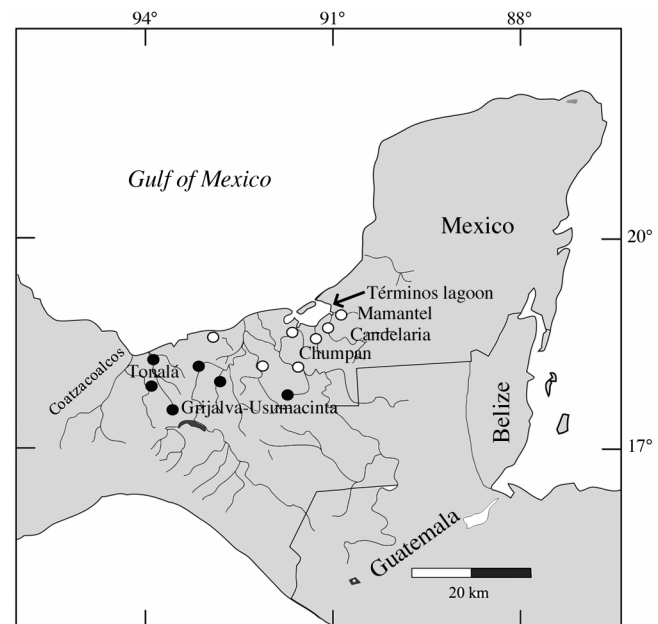


Figure 1. - Distribution of *Heterophallus echeagarayi* in the Usumacinta Province. Black circles = previous records by Espinosa-Pérez and Daza-Zepeda (2005) and Miller *et al.* (2005); white circles = new records.

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Table I. - Records of *Heterophallus echeagarayi* with locality names, geographical position (Lat./Long.), collection date and specimen number. CE = conductivity (μScm^{-1}); N = number of specimens; SL = standard length (mm); T = temperature ($^{\circ}\text{C}$); * new records.

Locality	Latitude	Longitude	CE	T	Sampling Date	N	SL Range
Grijalva Subbasin							
Chilapilla, Puxcatán River	17.920142°	-92.491386°	421	30	May 2014	7	15.5-19.6
El Hondo Stream, Mecoacán Lagoon	18.383390°	-93.054056°	250	38.8	August 2014	58	10.3-26.4
Usumacinta Subbasin							
Usumacinta River	17.762152°	-91.739117°	375-619	25.6-31.1	Aug. 2013-May 2014	30	17.8-27.5
Pochote stream Sta. 1, Chaschoc wetland	17.778069°	-91.740968°	390-657	25.5-28.1	Aug. 2013-May 2014	110	12.0-28.7
Pochote stream Sta. 2, Chaschoc wetland	17.789611°	-91.741255°	386-658	25.4-28.3	Aug. 2013-May 2014	53	14.8-24.0
El Carrizal stream, Palizada River	18.423321°	-91.828355°	416	28.7	September 2014	9	13.0-23.9
Chumpan Basin							
San Salvador Lagoon*	18.324385°	-91.499269°	264	25.5	December 2014	3	17.1-24.4
Candelaria Basin							
El Infiernillo stream*	18.528687°	-91.270342°	1052	30.3	September 2014	8	15.4-24.7
Guadalupe stream*	18.499219°	-91.261850°	973	24.1	December 2014	8	15.8-24.4
Mamantel Basin							
El Pital creek*	18.605618°	-91.223648°	1492	26.3	December 2014	2	15.8-16.0



Figure 2. - *Heterophallus echeagarayi* specimens from Candelaria River basin, SE Gulf of México.

2013 to December 2014. Electrical conductivity (EC) and temperature were measured *in situ* at each site. Fish were collected by fishing spoon nets, with 1 mm mesh, in the margin of emergent aquatic macrophytes.

Miller *et al.* (2005) keys were used for taxonomic identification. *H. echeagarayi* is distinguished from the other *Heterophallus* species because males show prominent fleshy palps on the side of the gonopodium and lack of pigment blotch in dorsal fin. The specimens are registered on the Colección Nacional de Peces, Instituto de Biología, UNAM, with catalog numbers from CNPE-IBUNAM19521 to CNPE-IBUNAM19525.

RESULTS AND DISCUSSION

A total of 288 specimens were captured in ten sampling sites,

where the EC and temperature fluctuated from 250 to 1492 μScm^{-1} , and from 24.1 to 38.8 $^{\circ}\text{C}$ (Tab. I).

Specimens of *H. echeagarayi* were collected in: 1) one site in the Chilapilla River, tributary of the Puxcatán River in the Grijalva subbasin; 2) one site in El Hondo stream, tributary of Mezcala-Cuxcuchapa River, which discharges in the coastal lagoon of Mecoacán; 3) three sites in the Chaschoc riverine wetland in the Usumacinta subbasin; 4) a shallow creek in the Palizada River, which is a branch of the Usumacinta River and drains into Términos lagoon; and 5) one site in Chumpan River; 6) a shallow creek in the Candelaria River; and 7) one site in the Mamantel River. The last three rivers discharge at the southern region of Términos lagoon (Tab. I, Fig. 1). The standard length (SL) of the specimens in all sites varied from 10.3 to 28.7 mm (Tab. I). The new records of *H. echeagarayi* from Chumpan, Candelaria and Mamantel basins extend its range of geographical distribution. Three females, asso-

ciated with emergent aquatic macrophytes, were collected in San Salvador in the Chumpan River. Nine males, five females and two unsexable fish were caught in mangrove roots in two streams connected to the Candelaria River. At last, two females were also found in mangrove roots in El Pital creek, which registered the maximum value of EC (Tab. I, Fig. 2). However, in this survey all EC values are limnetic and oligohaline (Tab. I).

All males, with advanced sexual maturity, exhibited an iridescent blue band in the caudal fin, which is lost when specimens are preserved. Moreover, these males presented one or two vertical dark lines on the body sides and fleshy lateral palps in the gonopodium. No specimen showed pigmentation in the dorsal fin.

The endemism of this species, mentioned by Minckley *et al.* (2005), in the Grijalva-Usumacinta Division is no longer accepted due to the new records in Chumpan, Candelaria and Mamantel basins. These new records support that the review of the distribution of *Heterophallus* genera is a pending task in the coastal plain of the South of the Gulf of Mexico

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